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Materiel Test Procedure 7-3-025

8 July 1970

U. S. Army Airborne, Electronics and Special Warfare Board

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

AIRCRAFT, SUITABILITY FOR TRANSPORT OF
TROOPS (AND LITTER PATIENTS)

SEP 10 1970

1. OBJECTIVE

This document is a guide to test methods and techniques for determining the suitability of aircraft for transport of troops and litter patients.

2. BACKGROUND

With demands for Army supported activity at almost all points on the globe, high speed mass transport of personnel is imperative. Large, long range aircraft meet the requirement for transport of personnel by providing a basic high speed vehicle configured by the use of appropriate kits to carry personnel with or without combat equipment and/or litter patients. These kits are usually designed to be quickly installed and removed and provide seating and individual equipment stowage facilities, personnel messing and comfort facilities, means for transport and care of litter patients, and means for interfacing with aircraft power/life support system to perform other functions necessary for safe, comfortable transport of personnel. Small and relatively short range aircraft are usually equipped for personnel transport through use of very simple fold-up or readily removable seats and minimum comfort facilities.

3. REQUIRED EQUIPMENT

- a. Tape Measure.
- b. Still Camera, Film, Flashbulbs and Photo Processing Facilities.
- c. Test Aircraft.
- d. Hardstand Area on which aircraft can be parked, loaded and unloaded, and suitable runway for take-offs and landings.
- e. Individual equipment and personnel equipment containers for number of troops to be transported.
- f. Equipment and Facilities required by referenced MTP's.
- g. Stopwatches.
- h. Noise Measuring Equipment.
- i. Thermometers.

REFERENCES

- A. USATECOM Regulation 70-23, Equipment Performance Reports (EPR's).
- B. USATECOM Regulation 70-24, Research and Development, Documenting Test Plans and Reports.
- C. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
- D. USATECOM Regulation 700-1, Value Engineering.

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- E. TM 55-450-15, Air Transport of Supplies and Equipment.
- F. Appropriate Loading Handbook for Aircraft being Tested.
- G. Specific Operational Requirements (SOR), Qualitative Materiel Requirements (QMR), or Detail Specification for Aircraft being Tested.
- H. MTP 6-3-500, Physical Characteristics.
- I. MTP 6-3-501, Pre-Test Inspection for Service Test.
- J. MTP 6-3-523, Safety.
- K. MTP 6-3-524, Maintenance Evaluation.
- L. MTP 6-3-525, Human Factors.
- M. MTP 7-1-002, Air Portability and Airdrop Service Testing.

5. SCOPE

Determining the suitability of an aircraft for transport of troops/litter patients is only one element of the complete service test. Service testing is conducted under field conditions by personnel representative of those who will be involved in actual air movement combat operations. The observations of test supervisory personnel together with measurements taken of major test-item parameters are recorded. Test personnel observations and suggestions are obtained through use of questionnaire and interview, and correlated with all still and motion pictures taken. The collected data is then analyzed and tabulations, charts or other suitable devices are employed to display the results showing test item suitability or unsuitability as appropriate.

5.1 SUMMARY

5.1.1 Preparation for Test

This section provides guidance for test project planning requirements for facilities and equipment, and instructions for test personnel familiarization.

5.1.2 Test Conduct

The tests and evaluations are arranged in a logical sequence to provide a step-by-step analysis of the suitability of the test aircraft for transport of troops/litter patients. These tests and evaluations are as follows:

- a. Physical Characteristics and Test Item Inspection - This section provides procedures for obtaining the physical and technical characteristics of the test aircraft and various transport kits, and a serviceability inspection to determine the condition of the aircraft and kits as received for test.
- b. Operational Performance - An evaluation to determine the suitability of the test aircraft to perform personnel transport missions.
- c. Maintenance - Throughout the conduct of all test procedures, maintenance actions resulting from testing are noted and reported. Manpower, special tools and equipment, availability of repair parts, suitability of

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maintenance instructions, and mean time to repair are evaluated.

d. Safety - An evaluation to determine the safety characteristics are possible hazards of the test aircraft while performing its test functions, and to provide safety confirmation.

e. Human Factors Evaluation - An evaluation of the man-item relationship under the prescribed test conditions to determine the adequacy of the design and performance as related to air transport of troops/litter patients.

f. Value Analysis - An evaluation directed at analyzing features and components for the purpose of reducing cost without compromising performance, safety, and suitability for personnel transport.

5.1.3 Test Data

This section details the raw data to be collected and recorded while completing the test procedures in paragraph 6.2, Test Conduct.

5.1.4 Data Reduction and Presentation

This section provides instructions for analyzing and evaluating raw data and presenting the results.

5.2 LIMITATIONS

None.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Test Project Planning

The test project officer and other designated test personnel must:

a. Review the test directive received from higher headquarters to gain a clear understanding of test objectives and all accompanying instructions. Review MTP 7-1-002 (Ref.4M) for service testing background.

b. Conduct a thorough study of stated requirements as contained in QMR's, SDR's, SOR's, the Test Directives, or other appropriate documents to insure that complete and suitable test criteria are selected.

c. Study thoroughly the materiel being tested to include, specifically, operational and technical characteristics as may be pertinent to or affected by the actual transport of troops/litter patients.

d. Plan for and schedule all test personnel and any personnel training required. Troop transport test projects may require use of several hundred personnel, both with and without combat equipment, depending on size and capacity of the test aircraft.

e. Determine all support items required. All such items not available at the test site location must be arranged for and any shipment scheduled.

f. Review the listing of Required Equipment (paragraph 3). Based

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on this review, the required items together with any operating personnel needed will be selected and scheduled.

6.1.2 Required Equipment/Facilities Setup

Troop transport test projects conducted at an established test facility will normally require minimum preparation with respect to equipment and facilities setup. Support items required are usually readily available but scheduling and planning for use are required.

6.1.3 Test Personnel Training and Familiarization

a. The test team shall consist of:

- 1) Supervisory test personnel to include the test project officer, assistant project officer and non-commissioned officers as required.
- 2) An operating crew for the test aircraft.
- 3) Military personnel to serve as transported test subjects.

b. The test project officer shall obtain all data pertinent to use of the test aircraft for transporting troops and litter patients, and shall instruct or supervise the instruction of all test team members in test objectives and methods. Test personnel shall be trained to perform all actions attendant to normal troop transport.

c. Prior to boarding the test aircraft, use of the aircraft's normal and emergency operations systems and the functions of test personnel during airborne testing and emergency operation shall be reviewed. The appropriate actions shall be practiced prior to performing airborne testing to insure test personnel safety and prevent aircraft damage during test performance.

d. All test personnel shall be instructed on completion of test questionnaires.

6.2 TEST CONDUCT

NOTE: All equipment malfunctions developed during the test period shall be reported in accordance with USATECOM Regulation 70-23 (Ref 4A).

6.2.1 Physical Characteristics and Test Item Inspection

a. Determine physical characteristics and conduct a serviceability inspection in accordance with the applicable procedures of MTP 6-3-500 (Ref 4H) and MTP 6-3-501 (Ref 4I), respectively.

b. Determine the physical layout of the troop compartments, seating arrangements, lavatories, entrance/exitways, ramps and passageways.

c. Ascertain provisions for personnel comfort. Consider number, type and size of seats; lighting facilities; size, number and positioning of lavatories; number and positioning of relief tubes; provisions for

serving meals and supplements; and facilities for stowage of personal equipment.

d. For litter transport, determine the number of litters that can be accommodated, relative positioning and spacing of litters with respect to each other and with aisles; provisions to service litter patients (hanging of plasma bottles, change bandages), and adequacy of lighting provisions. Determine facilities provided for litter patient attendants in number, size, and type of seating arrangements and stowage facilities for medical supplies.

e. Determine the location, number, and type of systems for dissemination of warnings and of information.

f. Determine the number, locations and mountings of all life support and emergency components and systems. These systems and components include fire escape axes, first aid kits, life rafts, emergency power and lighting facilities, mechanical door-opening mechanisms, ventilating and air-conditioning systems, and pressurization and oxygen supply systems.

g. Note the conditions of the test aircraft and associated systems for test. Submit an Equipment Performance Report (EPR)(Ref. 4A) for damages and omissions, as appropriate.

h. Take photographs for documentation as appropriate.

6.2.2 Operational Performance

6.2.2.1 Emergency Simulation

a. Ensure that test personnel are equipped with individual and organizational equipment normally carried for a combat mission. The number of test personnel shall be equal to the maximum troop-carrying capacity of the aircraft under test.

b. With the aircraft on the ground, complete all preparation requisite to troop transport (setting up seats, installing seat belts, preparing lavatory facilities, loading food stuff). Refer to reference 4F in completing this action.

c. Have the test personnel enter the aircraft, remove and stow individual equipment, and seat themselves according to a predetermined seating plan. Operate advisory signs and public address systems to ascertain their effectiveness.

d. Distribute to each individual questionnaires designed to elicit information concerning individual difficulties encountered.

e. Have each man seated with seat belts fastened. Simulate the following ground and water emergency conditions and evacuate the aircraft:

- 1) The aircraft had made a forced ground landing and had come to rest on its landing gear. Selected individuals will be designated to have various simulated injuries. Personnel are permitted to use all emergency exits.
- 2) The aircraft had been forced to ditch in the water on short notice and had settled to approximately wing level. Selected individuals will be designated to have various simulated injuries. Personnel are permitted to use only emergency exits above wing level.

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f. Repeat procedures of step e, preceding, with electrical power failure.

g. During all emergency simulation tests:

- 1) Take special note of exit accessibility, adequacy of provisions for reaching exits, and the means provided to reach the ground from exits.
- 2) Obtain egress times by stopwatch and personnel flow by motion picture.

h. After obtaining and recording personnel flow data and noting any difficulties or inability to complete egress procedures, perform the following additional tests:

- 1) Review the adequacy of fire fighting equipment and procedures for dealing with electrical, oil, and fuel fires. Verify proper operation of equipment.
- 2) Inspect the life rafts for security to aircraft and accessibility of location. Release the life rafts, determine that they can be released freely and safely from either inside or outside the aircraft. Determine that the life rafts are adequate to safely carry all personnel on the fully loaded aircraft.

6.2.2.2 Personnel Transport

- a. Repeat procedures given in paragraphs 6.2.2.1 a, b and c.
- b. Distribute to each individual questionnaires designed to elicit information on conditions and difficulties encountered during boarding, flight and unloading operations.
- c. With a capacity load of personnel with individual and organizational equipment normally carried for a combat mission on board, complete an actual flight of sufficient duration to determine the adequacy of inflight passenger accommodations.
- d. Consider vibration; noise level; ability of heating, air circulating; air pressurization systems to provide required level of comfort; sufficiency of messing, drinking water, and lavatory facilities to satisfactorily service full contingent of passengers during the extended flight. Verify that the public address and warning light/buzzer systems can be used to simultaneously alert and inform all onboard personnel; verify the existence of adequate lighting facilities to support normal passenger activity.
- e. Repeat procedures in steps a, b, c and d, preceding, using personnel with individual equipment as in an administrative move.

6.2.2.3 Litter Patients

- a. Remove and stow the seats; install litter kits. Complete any additional actions required to prepare aircraft for transport of litter patients.
- b. Install and stow all medical supplies and equipment in the aircraft that are required for care of litter patients with varied medical needs.

c. Use four-man and two-man litter teams, and load aircraft with litters and simulated patients.

d. Transport a full capacity load of simulated litter patients with attendants. Complete an actual flight of sufficient duration to determine the following:

- 1) Ease of loading/unloading litter patients.
- 2) Clearance between litters, and between the top litter and the ceiling to accommodate a patient with a leg splint.
- 3) Adequacy of working space and seating facilities for attendants.
- 4) Special facilities for in flight patient treatment, comfort and care such as special sanitary facilities and provisions for in-flight restraint.
- 5) Litter patient capacity.
- 6) If applicable, ability to reconfigure litter racks for special patient care.
- 7) Adequacy of stowage provisions for medical supplies and proximity of stowed supplies to litter patients.

e. Consider vibration, noise level, heating and air conditioning, messing facilities, drinking water and lighting.

6.2.3 Maintenance

Conduct maintenance evaluation using applicable guidance as outlined in MTP 6-3-524 (Ref. 4K).

6.2.4 Safety

Conduct the safety evaluation using applicable guidance as outlined in MTP 6-3-523 (Ref. 4J).

6.2.5 Human Factors Evaluation

Conduct the human factors evaluation using applicable guidance as outlined in MTP 6-3-525 (Ref. 4L).

6.2.6 Value Analysis

a. During the conduct of all tests, test personnel shall evaluate the test item(s) from a value versus cost standpoint. Record all pertinent comments concerning features or components which can be eliminated or modified to accomplish cost reduction without impairment of performance, reliability, quality, maintainability, or safety. The applicable portions of USATECOM Regulation 700-1 (Ref. 4D) shall be used for this evaluation.

b. Consideration shall be given to the topics listed below. Record appropriate comments for each topic.

- 1) Mission Capacity - The test item(s) should be capable of

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accomplishing the specified task with only a reasonable margin of excess capability. Excess capacity and unused capability normally results in unnecessary bulk, excessive weight and unwarranted costs.

- 2) Simplicity - Unnecessarily complex components and systems, redundancy, and the use of unneeded parts will increase costs and maintenance efforts.
- 3) State of the Art - In many instances the use of recently developed, currently available, components and automated features will result in an overall product improvement and cost savings.
- 4) Standardization - The use of identical parts and parts currently in the military system will reduce the overall logistics burden.
- 5) Materials and Methods of Construction - Polished surfaces, overdone finishes, and the use of expensive materials will result in unnecessary costs if used inappropriately.
- 6) Tolerances - Excessively close tolerances are costly and result in difficulties and delays in accomplishing assembly, routine maintenance, servicing and repair.

6.3 TEST DATA

Record the following:

NOTE: In compiling the Test Data section, test personnel should expound upon those data procedures that are other than quantitative in nature by recording narrative descriptions of events occurring during the conduct of the test.

6.3.1 Physical Characteristics and Test Item Inspection

- a. Aircraft nomenclature and serial number.
- b. Pertinent physical/technical/operational characteristics required by MTP 6-3-500 (Ref. 4H) and MTP 6-3-501 (Ref. 4I).
- c. Description of test item, components and accessories, including completeness when compared to the SOR (Ref. 4G).
- d. Tabulation and description of the aircraft physical characteristics as they pertain to capability and limitations in completing air transport of troops and litter patients.

- 1) Physical layout of troop compartment, seating arrangement, lavatories, entrance/exitways, ramps and passageways.
- 2) Number and type of seats.
- 3) Number of litters which can be accommodated.
- 4) Number and locations of life support and emergency components and systems to include axes, first aid kits, fire extinguishers, life rafts, emergency power and lighting facilities.
- 5) Advisory signs and public address systems.

e. Tabulation and description of the results of completing the serviceability inspection. Record any deviations of aircraft and aircraft systems from stated requirements.

f. Any unusual aircraft features, instances of deformation or damage, and other appropriate test results with photographs.

6.3.2 Operational Performance

a. Data pertinent to preparing the aircraft for transporting troops:

- 1) Setting up seats.
- 2) Installing seat belts.
- 3) Other preparations, e.g., relief facilities, water, food, stowage.
- 4) Time and personnel to configure aircraft.

b. Data pertinent to loading and unloading facilities - personnel/litter patients, e.g., doors, ramps, ladders, and steps used and difficulties encountered.

c. Data pertinent to stowage provisions for individual and organizational combat equipment and baggage; medical equipment and supplies; aircraft crew, baggage and equipment.

d. Data pertinent to troop seating facilities, e.g., number, size and type of seats; general seating arrangement; and comfort.

e. Safety data, including provisions of seat belts, emergency signals, fire fighting equipment, life rafts, emergency exits, first aid equipment, and appropriate identification markings and instructions for use.

f. Data pertinent to troop comfort provisions including sanitation facilities, drinking water, messing facilities, air circulation, air pressurization, heating and air conditioning, illumination, noise level.

g. Data pertinent to troop command and information facilities including advisory signs and public address systems.

h. Data pertinent to preparing the aircraft for transporting litter patients:

- 1) Installing litters.
- 2) Safety belts.
- 3) Other preparations to include stowage of medical supplies and equipment.
- 4) Time and personnel to configure aircraft.

i. Data pertinent to facilities for in-flight treatment of litter patients to include adequacy of working space and seating facilities for attendants; in-flight treatment facilities; patient comfort facilities and provisions for patients to request medical attention.

j. Data pertinent to emergency evacuation provisions to include number and location of exits, number and location of life rafts, egress times, and number of troops used in each simulated emergency test.

k. Data collected from questionnaires and observations of test personnel.

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1. Identify all photographs, as appropriate, for documentation.

6.3.3 Maintenance

The data required in MTP 6-3-524 (Ref. 4K).

6.3.4 Safety

The data required by MTP 6-3-523 (Ref. 4J).

6.3.5 Human Factors Evaluation

The data required by MTP 6-3-525 (Ref. 4L).

6.3.6 Value Analysis

- a. Appropriate comments for each of the topics listed below.

- 1) Mission Capacity
- 2) Simplicity
- 3) State of the Art
- 4) Standardization
- 5) Materials and Methods of Construction
- 6) Tolerances

- b. Proposals for changes in test item(s) features or components with reasons therefore.

6.4 DATA REDUCTION AND PRESENTATION

Summarize all data using tabulations and/or charts as appropriate. Analyze the data collected to determine the suitability of the aircraft for troop/litter patient transport. Provide a narrative description of the degree of suitability of the aircraft to perform its test function. If the aircraft is not suitable for its intended purpose, provide a complete description (including test results) of why the test item is so adjudged.

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